01 / STUDENT ACTIVITY

How many tiles make a border?

Suggested MYP Years 1-3 | 35 minutes | Patterns and algebra

Name: _____ Class: _____ Date: _____

Inquiry question

How can you count the one-tile-wide border of any square grid without counting each tile?

Draw square grids with side lengths 3, 4 and 5 tiles. Shade only the outside border. A corner tile counts once. Investigate whole-number side lengths n of at least 3.

You need: Squared paper; two colours

1. Choose a way to count border tiles and organise your results. Investigate more sizes if helpful.

2. Describe the relationship and write a rule for the border count B in terms of n.

3. Predict the count for a 12 by 12 grid; check it by another method.

4. Explain why your rule works for every permitted n. Compare two different counting methods.

Record your investigation

Use the space below and extra paper for diagrams, tables, calculations and your conclusion.

Exit response: What did you revise, and what evidence changed your mind?

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02 / STUDENT ACTIVITY

Does the order of discounts matter?

Suggested MYP Years 1-3 | 30 minutes | Percentages

Name: _____ Class: _____ Date: _____

Inquiry question

Is a 20% discount followed by a 10% discount the same as 30% off?

A fictional shop sells an item for 80 currency units. Offer A gives 20% off, then a further 10% off the reduced price. Offer B gives 30% off the original price. There are no taxes or extra fees.

You need: Calculator; paper

1. Predict which offer is better and explain your initial reasoning.

2. Calculate the final price under each offer; represent the changes with a diagram or multipliers.

3. Test other starting prices. Does your conclusion depend on the original price?

4. Reverse the two successive discounts. Explain what changes and what stays the same.

Record your investigation

Use the space below and extra paper for diagrams, tables, calculations and your conclusion.

Exit response: What did you revise, and what evidence changed your mind?

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03 / STUDENT ACTIVITY

Can a spinner game be fair?

Suggested MYP Years 1-3 | 40 minutes | Probability

Name: _____ Class: _____ Date: _____

Inquiry question

Can you redesign a spinner so neither player has an advantage?

A spinner has eight equally likely sectors: five blue and three gold. Blue awards Player A one point; gold awards Player B one point. Each spin is independent. You may simulate by drawing one of eight labelled slips and replacing it each time.

You need: Paper; pencil; optional spinner

1. Predict the scores after 80 spins and explain the assumptions.

2. Run 40 trials and record both frequencies. Compare the results with your prediction.

3. Redesign the sector colours to make equal one-point rewards fair.

4. Keep five blue and three gold sectors. Can you change the points per colour so expected scores are equal?

Record your investigation

Use the space below and extra paper for diagrams, tables, calculations and your conclusion.

Exit response: What did you revise, and what evidence changed your mind?

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04 / STUDENT ACTIVITY

Which rectangle gives the most space?

Suggested MYP Years 1-3 | 35 minutes | Area and optimisation

Name: _____ Class: _____ Date: _____

Inquiry question

If every rectangle has the same perimeter, must it have the same area?

You have 24 units of fencing to enclose a rectangle. Use positive whole-number side lengths. All four sides need fencing; no gates or shared walls are included.

You need: Squared paper; ruler

1. Find every different rectangle you can make; rotating a rectangle does not make a new case.

2. Compare areas and choose a representation that reveals a pattern.

3. Identify the largest area and explain why your list is complete.

4. Describe what happens to the area as the side lengths become more alike.

Record your investigation

Use the space below and extra paper for diagrams, tables, calculations and your conclusion.

Exit response: What did you revise, and what evidence changed your mind?

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05 / STUDENT ACTIVITY

When should you switch plans?

Suggested MYP Years 2-4 | 40 minutes | Linear models

Name: _____ Class: _____ Date: _____

Inquiry question

Which hire plan is cheaper, and when does the answer change?

A fictional bicycle hire service offers Plan A at 6 currency units plus 2 per hour, or Plan B at 15 plus 0.5 per hour. Time t is measured continuously for 0 <= t <= 8 hours. There are no extra charges or rounding rules.

You need: Calculator; graph paper

1. Choose useful hire times and compare both costs.

2. Represent the relationship with equations and a graph, defining your variables and units.

3. Find the break-even time and justify your recommendation for shorter and longer hires.

4. Consider a service that instead charges for each started hour. Explain how the model would change.

Record your investigation

Use the space below and extra paper for diagrams, tables, calculations and your conclusion.

Exit response: What did you revise, and what evidence changed your mind?

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06 / STUDENT ACTIVITY

Can an average hide the story?

Suggested MYP Years 2-4 | 30 minutes | Statistics

Name: _____ Class: _____ Date: _____

Inquiry question

Which average best describes a typical journey when one result is unusually large?

These are fictional journey times in minutes for seven students: 8, 9, 10, 10, 11, 12, 45. Use only the supplied data; you do not need to collect personal information.

You need: Calculator; paper

1. Calculate the mean and median. Decide which better communicates a typical journey and justify your choice.

2. Represent the data on a number line and explain why the two averages differ.

3. Replace 45 with 15, then with 90. Track which statistics change.

4. Write an honest two-sentence summary that includes both typicality and the unusual journey.

Record your investigation

Use the space below and extra paper for diagrams, tables, calculations and your conclusion.

Exit response: What did you revise, and what evidence changed your mind?

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07 / STUDENT ACTIVITY

Does doubling length double everything?

Suggested MYP Years 2-4 | 40 minutes | Similarity and measurement

Name: _____ Class: _____ Date: _____

Inquiry question

When a design is enlarged, what happens to perimeter and area?

A rectangular logo is 3 cm wide and 2 cm high. Create similar copies using scale factors 2, 3 and 4. Every length is multiplied by the same factor.

You need: Squared paper; ruler

1. Predict the new perimeters and areas before calculating.

2. Draw or tabulate the copies and compare length, perimeter and area ratios.

3. State and explain general rules for positive scale factor k.

4. A client wants twice the area. Find the scale factor and justify why doubling the lengths would not work.

Record your investigation

Use the space below and extra paper for diagrams, tables, calculations and your conclusion.

Exit response: What did you revise, and what evidence changed your mind?

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08 / STUDENT ACTIVITY

Which dice total should you choose?

Suggested MYP Years 2-4 | 40 minutes | Sample spaces

Name: _____ Class: _____ Date: _____

Inquiry question

If you win when two dice add to your chosen total, is every total equally good?

Two independent fair six-sided dice are rolled. You choose one integer total from 2 to 12 before rolling and score one point whenever that total occurs. All successful totals pay the same reward.

You need: Two fair six-sided dice; paper

1. Choose a total and justify your initial strategy.

2. Run 30 trials with a partner and compare frequencies. Keep a tally of every total.

3. Construct a complete sample space that distinguishes the first die from the second.

4. Recommend a total using theoretical probability, then explain why your short experiment may show a different winner.

Record your investigation

Use the space below and extra paper for diagrams, tables, calculations and your conclusion.

Exit response: What did you revise, and what evidence changed your mind?

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09 / STUDENT ACTIVITY

How large can an open box be?

Suggested MYP Years 4-5 | 50 minutes | Quadratic area and cubic volume

Name: _____ Class: _____ Date: _____

Inquiry question

Which corner cut makes the largest open box from a fixed sheet?

A sheet measures 20 cm by 30 cm. Cut equal squares of side x cm from all four corners and fold up the sides to form an open box. Ignore material thickness and tabs. First restrict x to whole centimetres with 1 <= x <= 9.

You need: Paper; ruler; scissors optional; calculator

1. Sketch the net and express the box dimensions in terms of x.

2. Choose a systematic method to compare all permitted cuts.

3. Find the best whole-centimetre cut and check your volume independently.

4. Allow any real cut with 0 < x < 10. Use a graph or numerical search to refine the best cut; distinguish a numerical estimate from a proof.

Record your investigation

Use the space below and extra paper for diagrams, tables, calculations and your conclusion.

Exit response: What did you revise, and what evidence changed your mind?

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Which savings plan wins over time?

Suggested MYP Years 4-5 | 45 minutes | Linear and exponential models

Name: _____ Class: _____ Date: _____

Inquiry question

Does a plan that grows by a fixed amount always beat one that grows by a fixed percentage?

Two fictional accounts start with 100 currency units at year 0. Account A adds a fixed bonus of 20 at each year end. Account B grows by 15% at each year end. There are no deposits, withdrawals, taxes or fees; keep full precision until reporting.

You need: Calculator; optional spreadsheet

1. Compare balances for whole years 0 through 8. Predict when one plan overtakes the other.

2. Write expressions for both balances after n years and identify the domain.

3. Find the first whole year when B exceeds A and check the years immediately before and after.

4. Explain why this fictional comparison is insufficient for choosing a real savings account.

Record your investigation

Use the space below and extra paper for diagrams, tables, calculations and your conclusion.

Exit response: What did you revise, and what evidence changed your mind?

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